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Disposable diaper

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INT CL[5] **A61F**
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KAOS KAO R07
Shorts type diaper - has single layer fibre-like outer sheet with opposed side edges forming leg openings and elastic held between front and back sheet portions
KAO CORP 92.07.10 92JP-183824
D22 P32 (96.07.10) *GB 2268389-A A61F 13/15, 13/72
93.07.01 93GB-013629
A disposable diaper of shorts type including an absorbent body and an elongate outermost sheet to which the absorbent body is connected, the absorbent body comprising a liquid permeable topsheet, a liquid impermeable and vapour permeable backsheet opposed to it and an absorbent core interposed therebetween, the side edges of the end portions of the outermost sheet being connected together to form a waist opening and two leg openings, the central portion of the outermost sheet in transverse cross-section being constituted by a single fibrous sheet and the side portions of the outermost sheet which define the leg openings being constituted by a plurality of fibrous sheets between at least two of which first expansible elastic members are retained which form first leg gathers around the leg openings. (Dwg.No.1/1)

(KAO BK)

FIG. 1

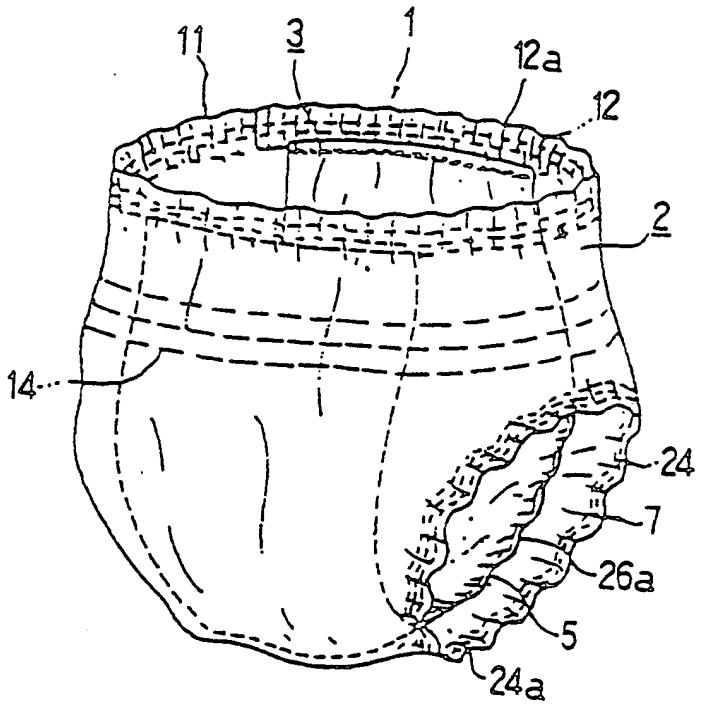
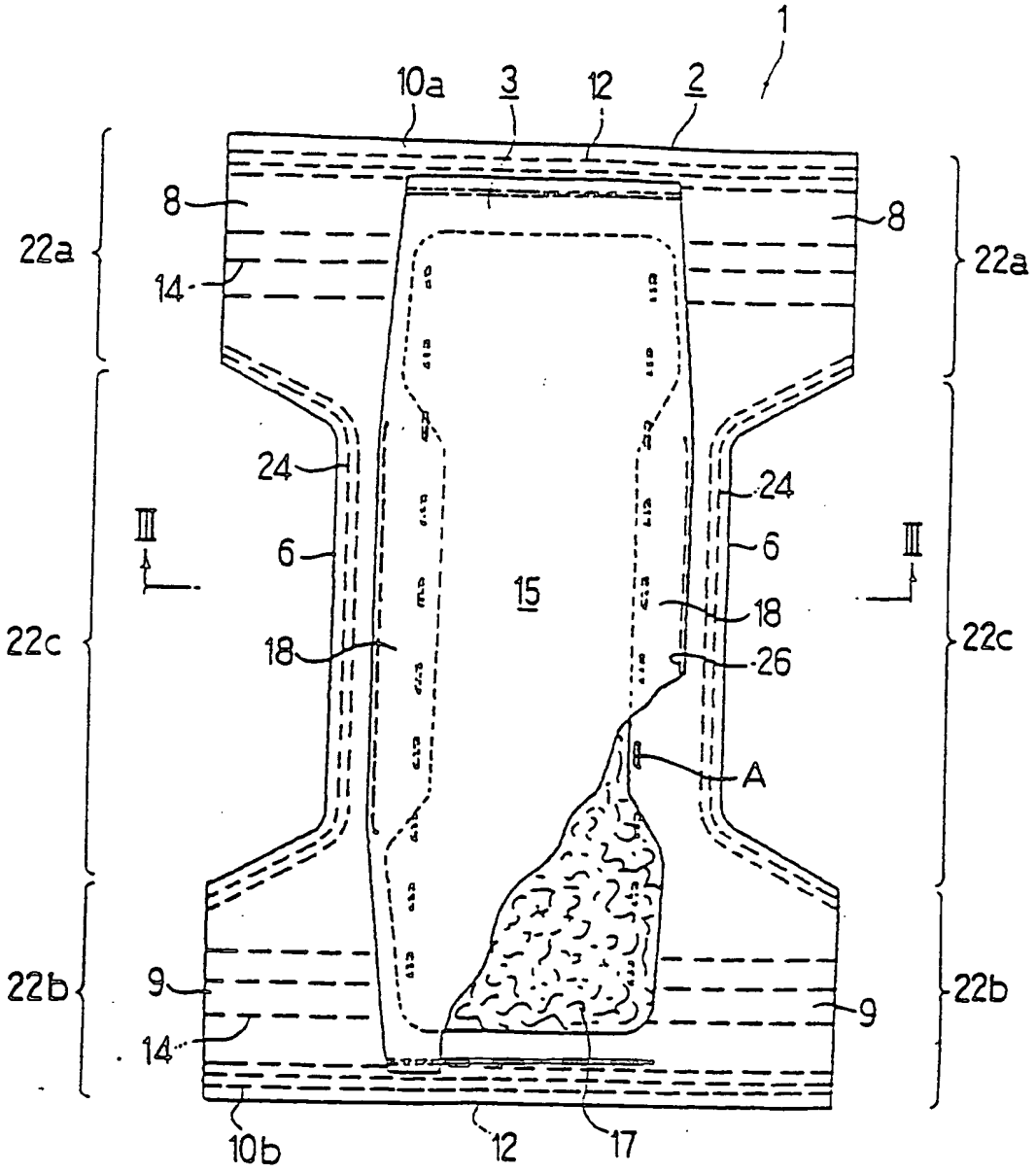


FIG. 2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10a
3
12
2
8
8
22a
22a
14
24
24
III
III
6
6
15
22c
22c
18
18
26
A
22b
22b
9
9
14
10b
12
17

FIG. 3

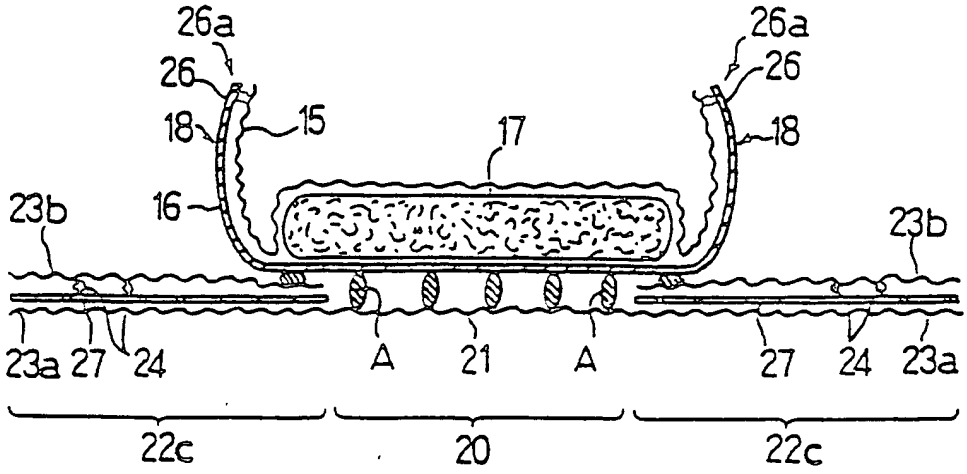
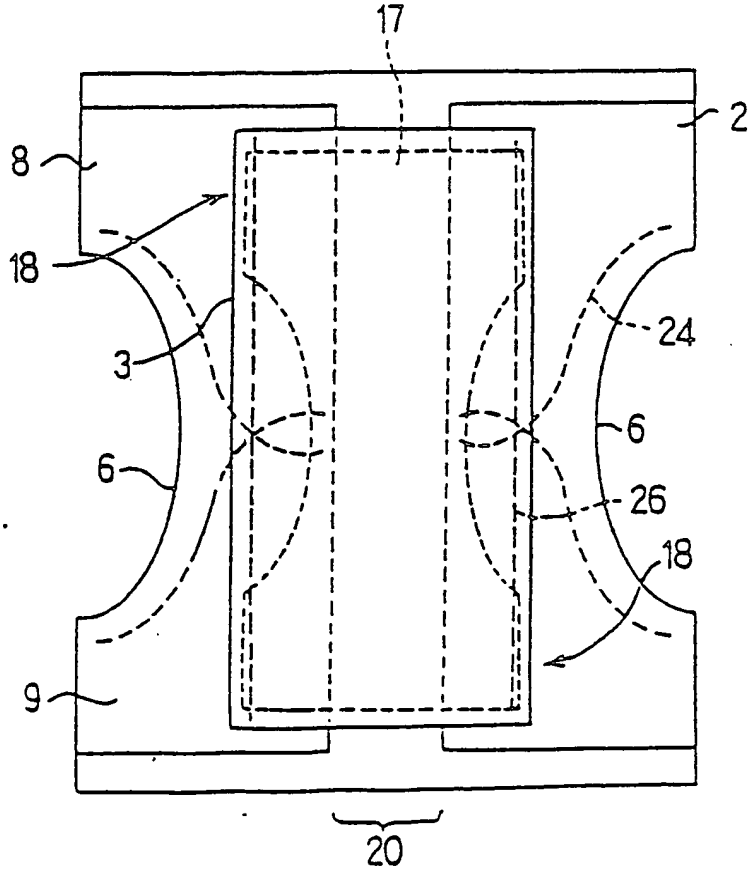

26a
26
18
15
17
26a
26
18
16
23b
23b
23a
27
24
A
21
A
27
24
23a
22c
20
22c

FIG. 4


17
2
8
18
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24
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6
26
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9
20

DISPOSABLE DIAPER

BACKGROUND OF THE INVENTION

[Field of the Invention]

This invention relates to a disposable diaper and particularly to a disposable diaper for the use of infants, adult persons, or incontinent persons.

[Description of the Prior Art]

As disclosed in, for example, Japanese Patent Publication No. Sho 52-40267, a typical conventional flat type disposable diaper comprises a diaper body including a liquid permeable topsheet, a liquid impermeable backsheet, and an absorbent core interposed therebetween. Side flaps extending sidewardly of the diaper body are provided with expansible elastic members, respectively, so that gathers are formed by the expansible elastic members. Fasteners are provided to opposite side edges on the back side of the side flaps, respectively. This arrangement is intended for improving fitness and anti-leakage. There is also known a disposable diaper as disclosed in Japanese Laid-Open Patent. Publication No. Sho 62-250201, in which a gather of each leg portion is formed in a three-dimensional structure and a flap portion around an absorbent body

is made of a water repellent material in order to enhance the effect of anti-leakage.

Recently, there was proposed a so-called shorts type disposable diaper as discussed in Japanese Laid-Open Patent Publication No. Sho 57-77304, in which a stomach side area and a back side area of a pair of side flaps are fixedly connected to form a pair of leg portions and a waist opening portion. In this shorts type disposable diaper, the leg opening portions and the waist opening portion are expansible so as to enhance fitness to the wearer's body. Usually, the shorts type disposable diaper is worn by its wearer in a standing state, and therefore it is not only useful as a training pants for encouraging an infant to be well without a diaper but also as a diaper for the use of an incontinent person or a person who has difficulty in walking.

However, since the above conventional shorts type disposable diaper is required to form an under-crotch portion narrow, the expansible elastic member cannot be arranged in such a manner as to be spaced away from the absorbent core. As a result, it is difficult for the diaper to exhibit its original expansible physical property because it is adversely affected by rigidity of the absorbent core. At the same time, connected

portions at opposite side edge portions of the diaper are readily susceptible to wrinkle and gap, thus creating a cause of leak of discharge material. For the leg gathers formed in a three-dimensional structure so as to be effective for anti-leak, this shorts type disposable diaper has such problems that the under-crotch portion is narrow and manufacturing is difficult.

The water repellent technique to be applied to the peripheral portion of the diaper is indeed effective to prevent leak of discharge material, particularly, urine. However, this technique, when applied to the shorts type disposable diaper, cannot exhibit its full effect because the under-crotch portion is narrow, and a hydrophilic portion and a water repellent portion are difficult to be made clearly distinctively.

Furthermore, since the conventional disposable diaper is designed such that the discharge material is absorbed and held by only an area around an urine discharge point, it is only this area which is soiled by the discharge material and the other part, for example, a side portion of the waist, is not substantially soiled. It is wasteful and uneconomical to dispose a whole diaper when the diaper is partly soiled.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a shorts type disposable diaper which is capable of effectively preventing leak of discharge material, which does not get stuffy, and which has an excellent compliance.

Another object of the present invention is to provide a shorts type disposable diaper, in which only the portion soiled by discharge material can be exchanged.

According to the invention there is provided a disposable diaper of shorts type including an absorbent body and an elongate outermost sheet to which the absorbent body is connected, the absorbent body comprising a liquid permeable topsheet, a liquid impermeable and vapour permeable backsheet opposed to it and an absorbent core interposed therebetween, the side edges of the end portions of the outermost sheet being connected together to form a waist opening and two leg openings, the central portion of the outermost sheet in transverse cross-section being constituted by a single fibrous sheet and the side portions of the outermost sheet which define the leg openings being constituted by a plurality of fibrous sheets between at least two of which first expansible elastic members are retained which form first leg gathers around the leg openings.

According to the disposable diaper of the present invention, when the absorbent body connected to the outermost layer sheet is applied to the under-crotch portion of the wearer as often experienced with an ordinary undergarment, the leg opening portions of the shorts type outermost layer sheet are fitted to the leg portions of the wearer when the diaper is in a wearing condition and therefore leak of the discharge material from these portions can be positively prevented.

Furthermore, since the central portion of the outermost layer sheet is formed of only a single layer fiber-like sheet, the central portion is excellent in moisture permeability and can be prevented from getting stuffy during the wearing condition of the diaper. Moreover, since the first leg gather portions are formed of a plurality of fiber-like sheets, leak of urine from the first leg gathers can be positively prevented.

Furthermore, since the central portion of the outermost layer sheet is formed in a single layer, this

portion is excellent in compliance to the under-crotch portion of the wearer.

In the disposable diaper of the present invention, if expansible elastic members are provided to opposite side edge portions of the absorbent body and second leg gathers are formed of the expansible elastic members, leak of discharge material can be more positively prevented by the second leg gathers.

Moreover, in the disposable diaper of the present invention, if the absorbent body is peelably connected to the outermost layer sheet, it is possible to reuse the outermost layer sheet by replacing the used absorbent body by a new absorbent body.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a disposable diaper according to one embodiment of the present invention;

Fig. 2 is a plan view, partly cutaway, of the disposable diaper of Fig. 1 which is in an expanded condition;

Fig. 3 is a sectional view of the disposable diaper of Fig. 2 taken on line III-III; and

Fig. 4 is a plan view of a disposable diaper according to another embodiment of the present inven-

tion.

DETAILED DESCRIPTION OF THE EMBODIMENT

Two embodiments of the present invention will be described hereinafter with reference to the accompanying drawings.

A disposable diaper 1 according to one embodiment of the present invention is a so-called shorts type. As shown in Figs. 1 and 2, the shorts type disposable diaper 1 comprises an absorbent body 3 including a liquid permeable topsheet 15, a liquid impermeable and vapor permeable backsheet 16 placed opposite to the topsheet 15, and an absorbent core 17 interposed therebetween, and an outermost layer sheet 2 to which the absorbent body 3 is connected and, when the diaper is in a wearing condition, surrounding a wearer's waist to hold the absorbent body in an abutting condition relative to the wearer. Opposite side edge portions 22a and 22b of a stomach side portion and a back side portion of the outermost layer sheet 2 are fixedly connected to each other respectively to form a waist opening portion 11 and a pair of leg opening portions 7 and 7. The outermost sheet 2 is formed, at a central portion 20 thereof in cross section, by a single layer fiber-like sheet 21, and opposite side edge portions

22c forming the leg opening portions 7 are formed by a plurality of fiber-like sheets 23a and 23b and expansible elastic members (hereinafter referred to as the "first expansible elastic members) connectively held by and between the fiber-like sheets. First leg gathers 24a are formed at the leg opening portions 7 respectively by the first expansible elastic members 24. In this embodiment, the fiber-like sheet 21 and the fiber-like sheet 23a are formed of one sheet.

The absorbent body 3 is provided at opposite side edge portions thereof with expansible elastic members (hereinafter referred to as the "second expansible elastic member") 26 respectively, and a second leg gather 26a is formed by the second expansible elastic member 26.

The outermost layer sheet 2 is substantially larger in dimension than the absorbent body 3. The absorbent body 3 is peelably secured to a longitudinally generally center of the outermost layer sheet 2 by an adhesive A. Cutaway portions 6 and 6 are formed at those opposite side portions of the outermost layer sheet 2 where the absorbent body 3 is adhered, such that when the opposite side edge portions 22a and 22b of the stomach side portion and the back side portion of the outermost layer sheet 2 are fixedly connected to

each other respectively, the leg opening portions 7 and 7 are formed at the cutaway portions 6 and 6, thereby forming a shorts type diaper. In the outermost layer sheet 2, an upper part (back side portion) relative to a constricted part where the cutaway portions 6 are formed is provided with a pair of side flaps 8 and 8 extending width-wise outwardly, and a lower part (stomach side portion) relative to the constricted part is provided with a pair of side flaps 9 and 9 extending width-wise outwardly. Opposite end edges of the side flaps 8 and 8, and 9 and 9 are attached to each other, respectively, to form a shorts type.

Longitudinally opposite end edge portions of the outermost layer sheet 2 are provided with a pair of waist flaps 10a and 10b, respectively, extending outwardly of the absorbent body 3 so that when the shorts type diaper is formed, the waist opening portion 11 is formed. The waist flaps 10a and 10b are provided respectively with third expansible elastic members 12 disposed width-wise along the waist flaps 10a and 10b, respectively, to form a waist flap gather 12a, while the cutaway portions 6 are provided respectively with the first expansible elastic members 24 disposed longitudinally along the cutaway portions 6, respectively, to form the first leg gathers 24a, respectively, so

that when the diaper is in a wearing condition, fitness of the diaper to the wearer is enhanced and a slip-down of the diaper is prevented. Furthermore, since a fifth expansible elastic member 14 is disposed between the waist opening portion 11 and the leg opening portions 7 and 7 when the diaper is in a wearing condition, fitness of the diaper around the waist of the wearer is enhanced.

As shown in Fig. 3, the central portion 20 of the outermost layer sheet 2 in cross section is formed of a single layer fiber sheet 21, so that moisture of the absorbent core 17 in the absorbent body 3 is released to prevent the diaper from getting stuffy when the diaper is in a wearing condition. This single layer structure also enhances compliance at the central portion with the result that compliance to the wearer at the under-crotch portion becomes excellent.

The opposite side edge portions 22c and 22c forming the leg opening portions 7 are formed by a plurality of fiber-like sheets 23a and 23b, and the first expansible elastic members 24 connectively held by and between the fiber-like sheets 23a and 23b, respectively. By forming the opposite side edge portions 22c and 22c in at least two-layer structure, leak of fluid can be positively prevented at the opposite side edge

portions 22c and 22c.

In this embodiment, the fiber sheet 21 at the central portion 20 and the fiber sheet 23a at a lower side of the opposite side edge portions 22c are used as a common sheet. That is, as shown in Fig. 3, an additional fiber sheet 23b is superimposed on the opposite side edge portions 22c of the single fiber sheet 23a (or 21).

A liquid impermeable and moisture permeable film (vapor permeable film) 27 is disposed between the fiber sheet 23a and the fiber sheet 23b. In this embodiment, the opposite side edge portions 22c of the outermost layer sheet 2 are resulted in three-layer structure. In this three-layer structure, the first expansible elastic members 24 are connectively held by and between the film 27 and the fiber sheet 23b. In other words, the first expansible elastic members 24 are adhered to the liquid impermeable and moisture permeable film 27, and this film 27 is held by and between the plurality of fiber-like sheets 23a and 23b. Owing to the three-layer structure including the film 27, the diaper of the present invention can prevent more positively the fluid from leaking from that portion.

As the fiber-like sheets 23a and 23b, there is used a hydrophobic non-woven fabric (either a single

layer or a plurality of layers) or the like which is made into a sheet by a span bond system, a heat bond system, a steam entangling system using a fiber composed of, for example, polyethylene, polypropylene, and polyester, or a composite fiber thereof. If feel and outlook as well as strength and absorbability of urine are to be taken into consideration, the non-woven material is preferably 5 to 35g/m^2. For prevention of leak of urine, the non-woven material is preferably subjected to surface treatment with a water repellent agent.

As the liquid impermeable and moisture permeable film 27, a film composed of, for example, a thermoplastic resin such as polyolefin and an inorganic filler such as calcium carbonate added thereto and stretched is used.

It is designed such that when attached to the outermost layer sheet 2, the absorbent body 3 is located at an inner side of the first expansible elastic members 24 disposed at the cutaway portions 6 so that the first leg gathers 24a and the second leg gathers 26a are not superimposed one upon the another.

The absorbent body 3 comprises the liquid permeable topsheet 15 forming the side contacting the wearer's skin, the liquid impermeable backsheet 16 corre-

sponding to the topsheet 15, and the absorbent core 17 interposed between the topsheet 15 and the backsheet 16. The absorbent body 3 is provided with a pair of body flaps 18 and 18 extending width-wise outwardly from opposite side edges of the absorbent core 17, and the body flaps 18 and 18 are formed by the topsheet 15 extending width-wise outwardly and the backsheet 16. Opposite side edges of the body flaps 18 and 18 are provided with the second elastic expansible members 26 and 26 disposed longitudinally along the absorbent body 3 to form the second leg gathers 26a and 26a, respectively.

The body flaps 18 and 18 define free ends respectively, and the absorbent body 3 is peelably adhered at only a generally central portion of the backsheet 16 to the central portion 20 of the outermost layer sheet 2 by the adhesive agent A. By this arrangement, the second leg gathers 26a and 26a are easily formed by the second expansible elastic members 26 and 26.

Next, material of the main component portions of this embodiment will be described.

The topsheet 15 is preferably a liquid permeable sheet capable of permeating discharge material to the absorbent core 17 and having the feel something like an undergarment (next-to-skin wear). As a liquid perme-

able sheet as just mentioned, for example, a woven fabric, a non-woven fabric, a perforated film, and the like are preferable. It may be arranged such that a peripheral edge portion of the topsheet 15 is subjected to water repellent treatment by a method for applying a hydrophobic compound such as a silicon series oil solution or a paraffin wax to the peripheral edge portion, or by a method for beforehand applying a hydrophilic compound such as alkylic phosphilic ester to the peripheral edge portion and then washing the peripheral edge portion with a hot water, so that leak of urine, etc. can be prevented at the peripheral edge portion.

As the backsheet 16, there is used a moisture permeable and liquid impermeable sheet obtained by applying filler to a thermoplastic resin and stretching the same or one having the feel something like the undergarment such as, for example, a composite material of film and non-woven fabric, or a composite material of film and woven fabric.

The absorbent core 17 is preferably composed chiefly of a comminuted wooden pulp and a molecular water polymer, but it is also preferably a mixture of thermoplastic resin, cellulosic fiber, and molecular water polymer, which is subjected to heating. The

molecular water polymer may be located at an upper layer, an intermediate layer, or a lower layer. The molecular water polymer may be mixed with pulp. The molecular water polymer preferably has an ability for absorbing and retaining an amount of liquid 20 times or more its dead weight, and is preferably of a granular form readily to be gelled. Such molecular water polymer is preferably, for example, starch-acrylic (salt) graft copolymer or saponified material of starch-acrylonitrile copolymer. The absorbent core 17 is preferably of an hour-glass shape so as to conform to the wearer's body shape, but it may be rectangular.

The first, second, third and fourth expansible elastic members 24, 26, 12 and 14 are connectively attached, generally in stretched condition, to the absorbent body 3 and the outermost layer sheet 2 by means known per se, such as ultrasonical welding, heat welding, adhesive or the like. Material of them may be any know suitable one such as yarn rubber, flat rubber, film type rubber, or tape-like foamed polyurethane, and the number of them may be single or plural. Such expansible elastic member is particularly preferably 70 to 100g.in stress when stretched 150%.

As the adhesive A, known peelable adhesive or the like is used. They are attached at an inner side of

the absorbent body 3, and preferably at an inner side of the absorbent core 17, either dottedly or linearly.

As material of the adhesive A, hot melt adhesive, styrene-butadiene copolymer, acrylic ester copolymer, vinyl acetate, ethylene-olefin copolymer, petroleum resin, cold glue or the like is used.

Operation of this embodiment will now be described.

The shorts type diaper of this embodiment is formed by connecting the opposite side edge portions of the side flaps 8 and 9 of the expanded outermost layer sheet 2 of Fig. 2 to each other to form the waist opening portion 11 and the pair of leg opening portions 7 and 7 as shown in Fig. 1. In this diaper, the absorbent body 3 is peelably attached to the outermost layer sheet 2 at an inner side thereof by the adhesive A. The opposite edge portions of the side flaps 8 and 9 are the opposite side edge portions 22a and 22b of the outermost layer sheet 2 at both the stomach side portion and the back side portion.

For wearing the shorts type diaper of this embodiment, the wearer inserts the legs into the waist opening portion 11, and pulls up the shorts type diaper so that the legs are inserted into the leg opening portions 7 and 7 respectively.

As described in the foregoing, in the shorts type disposable diaper of this embodiment, the waist flap gather 12a is formed at the waist opening portion 11 of the outermost layer sheet 3, and the first leg gathers 24a are formed at the leg opening portions 7 and 7 respectively when the diaper is in a wearing condition. Accordingly, fitness to the wearer, compliance and anti-leak are obtained. Moreover, owing to the provision of the fourth expansible elastic member 14, fitness to the wearer at the body area is enhanced.

As shown in Fig. 3, since the absorbent body 3 is adhered to the outermost layer sheet 2 at only the central portion when the diaper of this embodiment is in a wearing condition, the body flap 18 is easily erected to form a bag-like shape by the second expansible elastic member 26. Accordingly, discharge material can be positively arrested in the bag-like portion.

Furthermore, in the shorts type disposable diaper of this embodiment, the absorbent body 3 is formed with the second leg gather 26a, and therefore leak of discharge material from the absorbent body 3 to the outermost layer sheet 2 can be prevented. Since the second gather 26a as well as the first leg gather 24a of the leg opening portions 7 and 7 of the outermost layer sheet 2 are formed (that is, since a double gather is

formed), leak of discharge material from the leg portions can be more positively prevented.

Moreover, since the central portion 20 in the transversing direction of the outermost sheet 2 is formed by a single layer fiber sheet and the absorbent body 3 is supported by this single layer sheet 21, moisture permeability is not jeopardized, stuffiness during the wearing of the diaper is prevented, and fitness to the wearer at the undercrotch portion is enhanced. On the other hand, since the opposite side edge portions 22c of the outermost layer sheet 2 forming the first leg gather 24a are formed by the plurality of fiber sheets 23a and 23b and the support film 27, leak of discharge material from the opposite side edge portions is more positively prevented.

After the discharge material is discharged, the absorbent body 3 is peeled off the outermost layer sheet 2 for replacement, and a new absorbent body 2 is adhered to the outermost layer sheet 2 by the adhesive A. In this way, according to the embodiment of the present invention, only the absorbent body soiled with the discharge material can be exchanged easily.

For example, as shown in Fig. 4, the first expansible members 24 may be intersected at the central portion of the cutaway portions 6 of the outermost layer sheet 2. The absorbent body may be so simple in structure as having a generally square shape.

According to a disposable diaper of the present invention, leak of discharge material can be effectively prevented, stuffiness can be avoided, and compliance to the wearer at the under-crotch portion is excellent.

Furthermore, according to a disposable diaper of the present invention, only a portion of the diaper soiled with discharge material can be exchanged.

WHAT IS CLAIMED IS:

1. A disposable diaper of shorts type including an absorbent body and an elongate outermost sheet to which the absorbent body is connected, the absorbent body comprising a liquid permeable topsheet, a liquid impermeable and vapour permeable backsheet opposed to it and an absorbent core interposed therebetween, the side edges of the end portions of the outermost sheet being connected together to form a waist opening and two leg openings, the central portion of the outermost sheet in transverse cross-section being constituted by a single fibrous sheet and the side portions of the outermost sheet which define the leg openings being constituted by a plurality of fibrous sheets between at least two of which first expansible elastic members are retained which form first leg gathers around the leg openings.

2. A diaper as claimed in claim 1, wherein said absorbent body is provided at opposite side edge portions thereof with second expansible elastic members respectively, and second leg gathers are formed by said second expansible elastic members.

3. A diaper as claimed in claim 1, wherein said expansible elastic members are adhered to a liquid impermeable and moisture permeable film, and said film is held by and between the plurality of fibrous sheets.

4. A diaper as claimed in claim 1, wherein said absorbent body is peelably secured to said outermost sheet.

5. A diaper of shorts type substantially as specifically herein described with reference to Figures 1 to 3, optionally as modified by Figure 4, of the accompanying drawings.